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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,793	02/27/2004	Hung-Yi Huang	252016-3070	9430
47390	7590	11/09/2006	EXAMINER	
THOMAS, KAYDEN, HOSTEMEYER & RISLEY LLP 100 GALLERIA PARKWAY SUITE 1750 ATLANTA, GA 30339			VAN, LUAN V	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 11/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/789,793

Applicant(s)

HUANG, HUNG-YI

Examiner

Luan V. Van

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5,7,9,10,12-16,19,25,27 and 29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,7,9,10,12-16,19,25,27 and 29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 14, 2006 has been entered.

### ***Response to Amendment***

Applicant's amendment of September 14, 2006 does not render the application allowable.

### ***Status of Objections and Rejections***

The rejection of claims 6, 8, 11, 17, 18, 20-24, 26 and 28 is obviated by Applicant's cancellation.

All rejections from the previous office action are withdrawn in view of Applicant's amendment.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-5, 12 and 14 -16 are rejected under 35 U.S.C. 102(b) as being anticipated by Ueno.

Regarding claims 1 and 12, Ueno teaches an electroplating method and apparatus comprising: a reservoir 1 for holding an electrolyte fluid (figure 2) comprising metal ions for electroplating; an anode 4 and a cathode 7, said cathode for holding a wafer 6 provided in said reservoir 1; an electrical pathway 8 provided between said cathode and said anode; and a shield or auxiliary electrode 12 comprising a generally plate-shaped or disk (column 6 lines 16-18) shield body provided between said cathode and said anode, wherein said shield is imparted a positive charge as shown in Fig. 2 to act as an anode. An anode is broadly interpreted to be the electrode in a device that electrons flow out of to return to the circuit (i.e., to the cathode).

Regarding claims 3-4 and 14-15, Ueno teaches a shield comprising copper (column 6 lines 21-23); since the shield comprises a conductive material, the conductive material is inherently provided on an outer surface. The shield of Ueno is structurally capable of providing a source of metal ions because it is made of copper which is the same material as that of the instant claim.

Regarding claims 5 and 16, Ueno teaches a shield current source 14 electrically connected to said shield.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2, 7, 9, 10, 13, 19, 25, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueno in view of Mayer et al.

Regarding claim 7, Ueno teaches an electroplating apparatus comprising: a reservoir 1 for holding an electrolyte fluid (figure 2) comprising metal ions for electroplating; an anode 4 and a cathode 7, said cathode for holding a wafer 6 provided in said reservoir 1; an electrical pathway 8 provided between said cathode and said anode; and a shield or auxiliary electrode 12 comprising a generally plate-shaped or disk (column 6 lines 16-18) shield body provided between said cathode and said anode, wherein said shield is imparted a positive charge as shown in Fig. 2 to act as an anode.

With respect to increasing a plated metal thickness uniformity, since the prior art structure is capable of performing the intended use as recited in the preamble, then it

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meets the claim. See, e.g., *In re Schreiber*, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997).

Ueno differs from the instant claims in that the reference teach using a plate-shaped or disk (column 6 lines 16-18) shield body provided between said cathode and said anode but does not explicitly disclose the shield is ring-shaped (claim 7), although Ueno teaches that "The size and shape of the auxiliary electrode, the curve of the wafer opposing surface, and the like may be determined as appropriate so that uniform current densities and uniform electric lines of force are created on the wafer surface, and may be set as appropriate in accordance with the characteristics of the plating apparatus. The auxiliary electrode is not limited to those disks having holes as employed in the foregoing embodiments, and may use various materials such as mesh-like ones. A disk used as the auxiliary electrode is not necessarily provided with the holes for letting the plating solution therethrough" (column 6 lines 6-23).

Nevertheless, Mayer et al. teach an electrochemical reactor is used to electrofill damascene architecture for integrated circuits (see Abstract). A shield is used to screen the applied field during electroplating operations to compensate for potential drop along the radius of a wafer. The shield establishes an inverse potential drop in the electrolytic fluid to overcome the resistance of a thin film seed layer of copper on the wafer. Furthermore, Mayer et al. teach the shield can have many forms. A mechanical iris may be used to change the size of the aperture or a strip having different sizes of apertures may be shifted to vary the size of aperture that is aligned with the wafer. The shield may be raised and lowered to vary a distance that separates the shield from the wafer. The

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wafer or the shield may be rotated to average field inconsistencies that are presented to the wafer. The shield may have a wedge shape that screens a portion of the wafer from an applied field as the wafer rotates. The shield may also be tilted to present more or less surface area for screening effect. (Column 4 lines 30-40).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the shield of Ueno by using the ring-shaped shield of Mayer et al., because a ring-shaped shield helps to provide uniform current densities on the wafer surface, thus enhancing uniform electroplating and electrofilling of metallization or wiring layers for integrated circuit (column 4 lines 6-18 of Mayer et al.).

Addressing claims 2 and 13, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the shield of Ueno to a ring-shaped shield of Mayer et al., because a ring-shaped shield helps to provide uniform current densities on the wafer surface, thus enhancing uniform electroplating and electrofilling of metallization or wiring layers for integrated circuit (column 4 lines 6-18 of Mayer et al.).

Regarding claims 19, 25 and 27, although Ueno is silent to the specific relative dimension of the shield and the anode of the instant claims, Ueno teach that "The size and shape of the auxiliary electrode, the curve of the wafer opposing surface, and the like may be determined as appropriate so that uniform current densities and uniform electric lines of force are created on the wafer surface, and may be set as appropriate in accordance with the characteristics of the plating apparatus. The auxiliary electrode is not limited to those disks having holes as employed in the foregoing embodiments, and

may use various materials such as mesh-like ones. A disk used as the auxiliary electrode is not necessarily provided with the holes for letting the plating solution therethrough" (column 6 lines 6-23).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method and apparatus of Ueno by modifying the diameter of the shield such that it is greater than the diameter of the anode, because a skilled artisan would be able to determine the appropriate diameter of the shield such that it is greater than the diameter of the anode through routine experimentation in order to provide uniform electroplating, and because modifying the diameter of the shield such that it is greater than the diameter of the anode would allow a larger substrate to be uniformly electroplated. Furthermore, changes in shape would be a matter of design choice within the ability of one having ordinary skill (MPEP 2144.04).

Regarding claim 29, Ueno differ from the instant claims in that the reference does not explicitly teach rotating the wafer. Mayer et al. teach that the wafer can be rotated. (Column 4 lines 30-40).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Ueno by rotating the wafer as taught by Mayer et al., because rotating the wafer averages out the field inconsistencies that are presented to the wafer (column 4 lines 30-40 of Mayer et al.), thus improving the thickness uniformity.



***Response to Arguments***

Applicants' arguments have been considered but are moot in view of the new ground(s) of rejection.

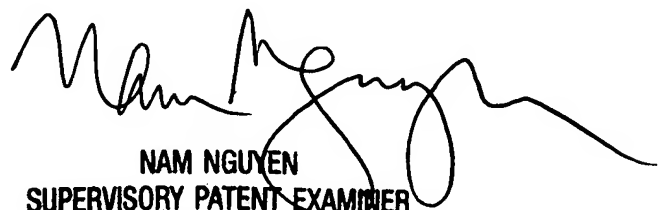
***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LVV  
November 3, 2006

  
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